SEASONAL SEA MAMMAL EXPLOITATION AND BUTCHERING PATTERNS IN AN ARCHAIC SITE (TAIRUA, N44/2) ON THE COROMANDEL PENINSULA

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Abstract. Detailed analysis of a small assemblage of sea mammal bones from the Archaic archaeological site (N44/2) of Tairua is presented. Consideration is given to the species of sea mammals present, their age and sex, and the manner in which they were killed and butchered. The results suggest a significant difference between the breeding distribution of fur seals in the past and that extant today. Mechanisms for this change, and the implications for New Zealand prehistory are considered.

The Tairua site (N44/2) on the Coromandel Peninsula is of considerable importance in New Zealand prehistory and has stimulated a long history of archaeological research. Excavations undertaken in 1958 and 1959, and an analysis of the fauna' and artefactual material were presented in the initial site report (Smart & Green 1962). Further excavation took place in 1964 (Green 1964). Various components of the site have been the subject of more intensive studies, including: the obsidian (Green 1964); the fishing gear, including a pearl shell lure shank (Crosby 1966, Green 1967); the stone technology (Jones 1972); the shell middens (Davidson 1964, Rowland 1977b); the limpet, *Cellana denticulata* (Rowland 1976); the birds (Rowland 1977b); and the question of seasonality and duration of occupation at the site (Rowland 1977a).

The cultural material in the site derives from two functionally and temporally discrete layers. The earlier of these, layer 2, contains a wide range of faunal, artefactual and structural evidence which is consistent with that in many other Archaic sites in the North Island. It has been argued that this layer may belong to the initial period of occupation in the Coromandel area (Green 1970: 17). The later occupation represents a markedly different pattern, being a midden composed almost entirely of mudflat shellfish species. The sea mammal material discussed in this paper is from the earlier layer.

Problems with the dating of layer 2 have been discussed elsewhere (Green 1967: 83, Rowland 1976: 6), but a brief summary is necessary here as the age of this occupation is of some importance in this paper. Two C^{14} dates for charcoal from an oven in this layer were obtained, giving the widely divergent results of A.D. 1072 $\pm$ 49 (N.Z. 594), and A.D. 1507 $\pm$ 40 (N.Z. 595) [dates calculated with respect to the 'old' half-life, and with no secular correction]. The earlier date was accepted, being more in keeping with the faunal and artefactual evidence from the site. Contamination of the second sample was suggested as a likely explanation for the discrepancy between the dates. However, identification of the wood in other charcoal samples has indicated the presence, in variable amounts, of the fossil remains of species such as kauri (Green pers. comm.). Thus the earlier date may be older than the occupation because it

incorporated firewood from dead trees. This is supported by a more recent date on shell of A.D. 1380 ± 60 (N.Z. 1875) which also casts some doubt on the earliest date. The age of this layer must remain in question, although a date no later than the fourteenth century is to be preferred (Rowland 1976: 6).

The layer 2 sea mammal remains from both the 1958-59 excavations (housed in the National Museum) and the 1964 excavations (housed in the Auckland Institute and Museum) have been combined to provide a complete picture of sea mammal exploitation during the early occupation. Part of the material under study has been identified and described previously (Yaldwin 1962) and the remainder identified by R. J. Scarlett. However, a re-analysis in the light of a recently developed approach to the study of prehistoric sea mammal exploitation (Smith 1976) is considered appropriate, and in keeping with the history of research on this site. It also serves to supplement and correct inaccuracies in the sea mammal data and its assessment provided by Rowland (1977a: 141, 1977b: 239).

IDENTIFICATION AND MINIMUM NUMBERS

Identifications were made through comparison with specimens held in the Anthropology Department, University of Otago, with the exception of the cetacean bone which was identified at the National Museum. Apart from a small number of unidentifiable fragments all seal bones were able to be identified to species level. Three species were found to be present; the New Zealand fur seal (*Arctocephalus forsteri*), the Southern elephant seal (*Mirounga leonina*), and the New Zealand sea lion (*Phocarctus hookeri*). The two cetacean bones in the assemblage are from either a Pilot whale (*Globicephala melaena*) or a False Killer whale (*Pseudorca crassidens*), most probably the former (Green pers. comm.).

Two methods were employed to generate minimum numbers. Firstly a raw minimum number of individuals was calculated for each species using a method adapted from that outlined by B. F. Leach (1976: 426-9). The results of this analysis are presented in Table 1. A second calculation was performed on the fur seal material taking into account estimates of age and sex to produce a minimum number per age/sex category (see below).

Table 1. Raw minimum numbers of sea mammals.

Species	Raw Minimum Number
N.Z. fur seal	6 *
Southern elephant seal	1
N.Z. sea lion	1
Cetacean (probably Pilot whale)	1

* Minimum number of fur seals increased to 9 when age and sex are considered.

The number of individuals by which each species is represented is not large. This creates very real problems with respect to the validity and reliability of the following interpretations. Thus, they must be considered as merely a suggested explanation of the nature of sea mammal exploitation evidenced at the site.

PROPORTIONAL REPRESENTATION OF ANATOMICAL PARTS

Consideration of the relative frequency with which various anatomical parts occur in the site allows some assessment of the manner in which the seals were killed, and

of the treatment of their carcasses after death. The remains of each species will be considered in turn.

Fur Seals

There is no direct evidence of the manner in which the fur seals in Tairua were killed. However, the nature of the cranial material in the site suggests that the simple and effective method employed by many of the European sealers might have been used. This involves delivering a sharp blow to the snout of the animal with a club, or some other heavy instrument. Breakage of at least some of the bones of the splanchnocranial region of the skull (the facial bones) would be a likely consequence of this procedure, while the neurocranium (the bones encasing the brain and inner ear) would be left relatively intact. The crania present in the site include only five bones from the splanchnocranium. The remaining 63 fragments are all from the neurocranium. Fourteen of these fragments came from a single quadrant in one square and were able to be reconstructed into an almost complete neurocranium. The same applies to 17 fragments from another square, and 30 from a third square. This suggests that the neurocrania were in a complete, unbroken condition when they were deposited in the site. The relative absence of splanchnocranial bones, and the more or less complete state of the neurocrania are consistent with the killing method suggested above.

Turning now to consider treatment of the fur seal carcass after death, the proportional representation of various anatomical parts can be used to determine the

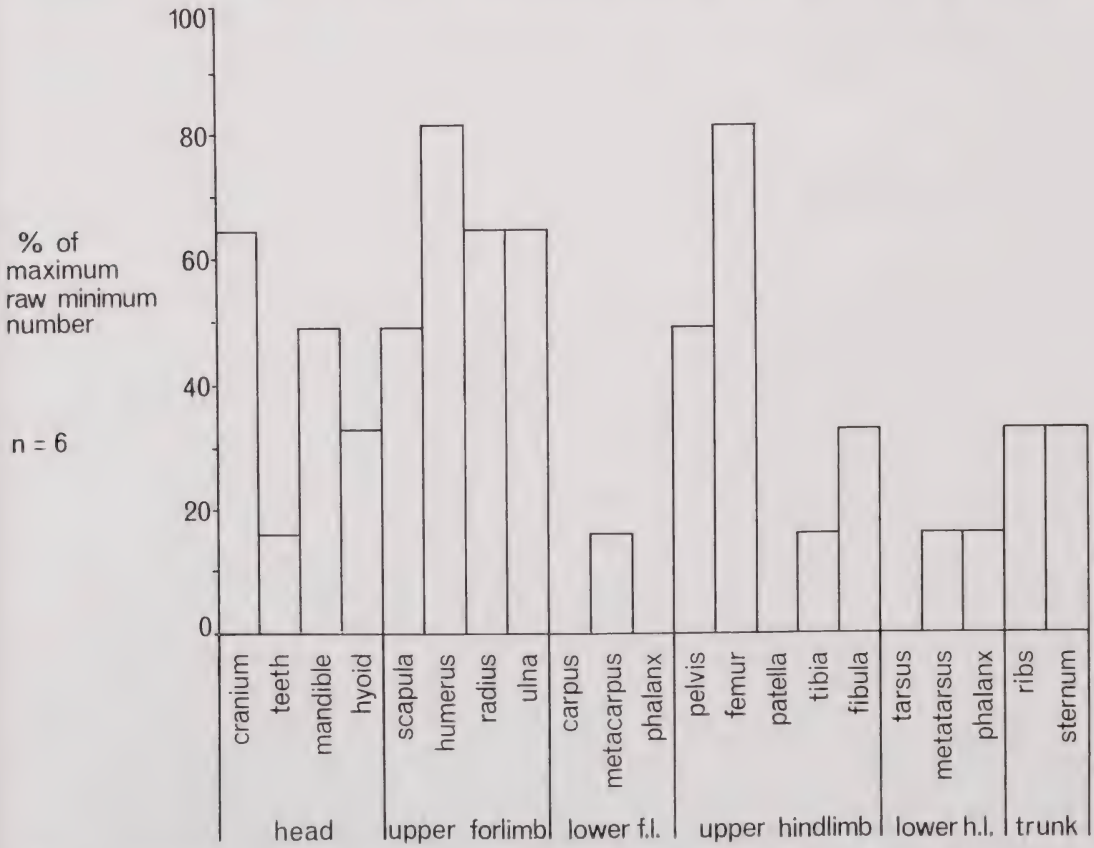

Fig. 1. Tairua fur seals. Histogram of raw minimum numbers by various body parts.

manner in which the animals were butchered. The raw minimum numbers of individuals represented by various body parts are presented as percentages of the maximum raw minimum number in Figs. 1, 2. Raw minimum numbers were used in this

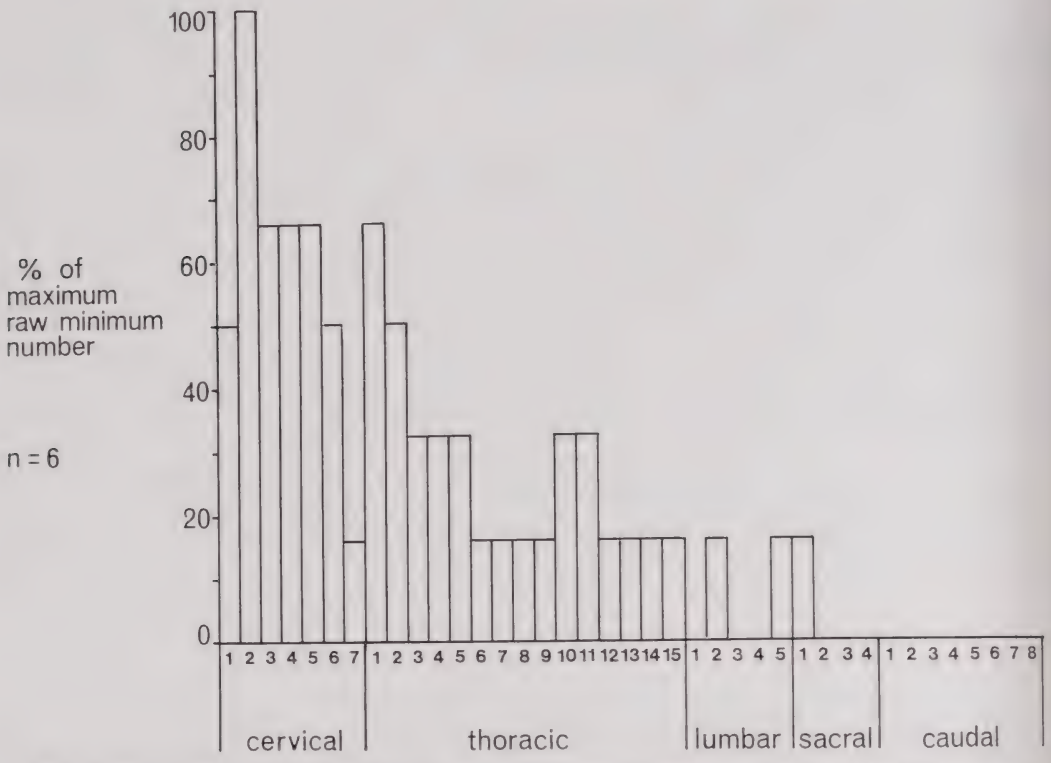

Fig. 2. Tairua fur seals. Histogram of raw minimum numbers by vertebral elements.

analysis to ensure completeness of data, as age/sex estimates could not be made for the skeletal elements of all body parts. The most frequently occurring bones derive from the neck and upper back (cervical and upper thoracic vertebrae), the upper forelimb, and the upper hindlimb. Also well represented are bones of the head. Conspicuous by their low representation or complete absence are the lower forelimb and hindlimb, and the lower back (lumbar, sacral, and caudal vertebrae). The trunk of the body and the middle section of the backbone (mid and lower thoracic vertebrae) are represented by a moderate number of individuals.

The complete absence of some body parts and the uneven distribution of others suggests that the fur seal carcasses were butchered before being brought to the site. The three body parts represented by the greatest numbers of individuals all provide substantial quantities of meat. While there is no quantative data on the meat content of various body parts, personal experience in the butchering of fur seals indicates that the greatest quantity of meat is found in the region of the upper forelimb and neck. The upper hindlimb also provides a substantial quantity of meat. The high representation of these body parts in the site suggest that the fur seals were butchered in such a way as to procure the best cuts of meat. Obversely, some of the body parts absent or represented by only a small number of individuals provide little or no meat. The lower forelimb, lower hindlimb, and lower back all fit into this category.

There are a number of alternative explanations for this pattern that should be considered. Some bones are less likely to survive in archaeological sites, or are more difficult to identify than others, and therefore may be under represented in Figs. 1, 2. This could well be the case for ribs which are extremely difficult to identify in the fragmentary condition in which they are usually found in archaeological sites. It may also apply to tibiae and fibulae. This explanation cannot be accepted for the other poorly represented body parts. The bones of the lower limbs, being dense and compact and with very distinctive shapes, usually survive well and are relatively easy to identify. Similarly, the absent caudal vertebrae are neither more fragile nor more difficult to identify than the commonly occurring cervical and thoracic vertebrae. A second possibility is that the less well represented bones were present in some un-excavated portion of the site. However, this possibitity cannot be evaluated.

Parts of the fur seal carcass could have been used as items of trade and as a consequence do not occur in the site. This would appear to be an unlikely explanation for the low representation of the lower limbs as they contain almost no meat, and would have little value as trade goods. The middle section of the vertebral column and the trunk of the body do provide a reasonable quantity of meat and their low representation in the site could be explained in this way.

Elephant seal

The small quantity of elephant seal material in the site — eighteen positively identified bones in all — makes assessment of killing and butchering methods almost impossible. The identified bones are from the head, trunk of the body, left forelimb, and the right hindlimb. This wide representation of body parts suggests that they came from an elephant seal which was killed or stranded near to the site, rather than from an animal butchered elsewhere.

Sea Lion

As this species was represented by only 3 teeth it is not possible to consider killing and butchering methods.

Cetacean

The Pilot whale or False Killer whale was represented by two bones from the upper forelimb. This may indicate the acquisition by trade or exchange of a single meat-bearing body part of this animal.

ESTIMATIONS OF AGE AND SEX

Accurate assessment of the age and sex of seals found in archaeological sites can provide important information on prehistoric human activity. Seals of particular age and sex groups exhibit specific behaviour patterns which impose limits on where and when they can be hunted by man (Smith 1976: Chapter One). At present, methods of age and sex determination are not sufficiently sophisticated to permit accurate estimations for all seal remains. A method has been developed that allows fur seals to be placed in one or other of five age/sex categories on the basis of the dimensions of their humeri and femora (Smith 1976: Chapter Three). Application of this method to the Tairua material indicates that the fur seals in the site are predominantly of sub-adult age. The number of individuals placed in each age/sex category are presented in Table 2. This expands the raw minimum number from six to nine individuals, placing one in the adult male category, four in the sub-adult male group, and two in each of the juvenile and pup categories. A subjective assessment of the age/sex status

Table 2. Minimum number of fur seals per age/sex group.

Age/Sex Category	Minimum Number
Adult male	1
Adult female	0
Sub-adult male	4
Juvenile	2
Pup	2
Maximum minimum number	9

of bone other than humeri and femora, based on their size with respect to comparative specimens of known age and sex, tends to corroborate these results.

Some reservations must be held about the accuracy of the separation of the juvenile and pup categories because of the lack of accurately aged comparative material for these two groups. Thus, it cannot be stated with certainty that the Tairua assemblage includes two juveniles and two pups. There is little doubt about the two individuals assigned to the juvenile category as they are too large to be pups. However, the other two fall at the borderline between these two groups, and until further accurately aged comparative material is available their assignation to the pup category must be accepted with due caution.

The single elephant seal is probably a sub-adult male. This assessment is based on its size, and the unfused state of its epiphyses. A metrical method is available for determining age and sex from elephant seal bones (Bryden 1972) but could not be used because of the fragmentary nature of the material. Estimates of age and sex were not possible for the other two species in the site.

SEASONALITY

Having established the age/sex composition of the Tairua fur seal assemblage it is now possible to consider the seasonal nature of the seal hunting exhibited there. A basis for the following interpretations has been presented elsewhere (Smith 1976: 13-19, 72-75). The small number of individuals involved requires that these interpretations be accepted with caution.

It is probable that the fur seals in Tairua were hunted at or near a breeding colony (see following section), and consequently would have been available for hunting at all times of the year. The evidence in the site is insufficient to establish with certainty whether advantage was taken of this year round availability. The presence of sub-adult males could indicate summer exploitation as this group are more common at breeding colonies during the summer months. However, as they are also present at other times of the year a definite assessment cannot be made. Similarly, the presence of juveniles may perhaps indicate winter exploitation as they are more common at breeding colonies at that time of year, but once again a positive conclusion cannot be drawn. The only conclusive evidence of seasonality is provided by observations of the size of the two juveniles. The bones of these two individuals are almost exactly the same size as a comparative specimen (FB 207) aged 17 months. As fur seal pups are born in December this would suggest that these individuals were hunted during the winter.

The presence of an elephant seal and a sea lion provide further possible indications of winter exploitation, as both these species are more common in New Zealand waters at this time of the year (Gaskin 1972: 149, 155). A number of recent sightings of

elephant seals during the summer months suggest that the presence of this species in a site may not be a completely reliable winter indicator (Smith n.d).

The evidence presented here equates well with the results of a recent review of the shellfish, bird and sea mammal material from layer 2 of the Tairua site (Rowland 1977a: 138-145). Rowland considered the positive seasonal indicators from each faunal component and the problems involved in evaluating the worth of each in determining season of site occupation. While he was unable to preclude the possibility of occupation at other times of the year, the bulk of his evidence suggested early winter/winter occupation. The fuller assessment of all the sea mammal data presented here provides more concrete support for winter occupation than Rowland was able to adduce, principally through the evidence for hunting of juvenile and pup fur seals, which he indicated were not present (Rowland 1977a: 141). However, it still does not entirely preclude occupation during other seasons.

IMPLICATIONS FOR THE PREHISTORIC DISTRIBUTION OF FUR SEALS

The age/sex composition of the Tairua fur seal assemblage suggests that there were colonies — probably breeding colonies — in the Coromandel area at an early stage in New Zealand's prehistory. Pups are found almost exclusively at breeding colonies (Wilson 1974: 29). Juveniles occur at both breeding and non-breeding colonies, although when at the latter they are generally only at those near to breeding colonies (Wilson 1974: 71). As neither of these two groups undertake the long coastal migrations of adult and sub-adult males, it would appear likely that a breeding colony existed somewhere not too distant from Tairua. The presence of fur seals in a number of other early sites in the Coromandel area — for instance, Hotwater Beach (N44/9, q.v. Leahy 1974) and Whangamata Wharf (N49/2, q.v. Allo 1972) — provide some corroboration of this hypothesis, although detailed analysis of these assemblages would be necessary to establish whether or not breeding colonies were indicated.

In protohistoric and historic times there have been no fur seal colonies recorded in the Coromandel area. None were reported by the early European explorers and sealers (Chapman 1893: 447-9, Gaskin 1972: 47), and today fur seals are seldom seen anywhere on the east coast of the North Island, except for occasional sightings at Cape Kidnappers and Cape Brett (Wilson 1974: 29). In fact, the modern distribution of breeding colonies is restricted to the south and south-west coasts of the South Island, while non-breeding colonies are found in suitable locations all around the coasts of New Zealand except for the east coast of the North Island (Crawley & Wilson 1976: 4-6). The possibility that a breeding colony existed somewhere in the Coromandel area, more than 1300 km north of the present northern limit of breeding on the east coast, suggests that there have been major changes in fur seal distribution during the last millennium.

Two factors might be suggested to account for this — human predation, and climatic change. It is difficult to assess the possible effects of human predation on fur seals during the prehistoric period because of the paucity of information on the location and dating of their remains in archaeological sites. The history of European sealing around the New Zealand coast indicates that intensive exploitation can effect the distribution of fur seals (see, for instance, Chapman 1893: 447-8). Furthermore, analysis of the fur seal remains from a site in the Chatham Islands has shown a hunting pattern in which breeding adults appear to have been taken in preference to younger individuals (Smith 1976: 75-8). Continuation of this hunting pattern over a

long period of time would almost certainly have reduced the size of the breeding population, and may have served to limit the distribution of the species. As yet, fur seal hunting at either the scale and intensity of European sealing, or of the selective nature evidenced in the Chatham Islands has not been documented for the prehistoric period in New Zealand. However, both these examples do suggest ways in which the distribution of this species might have been reduced by human predation.

Climatic change presents an alternative or perhaps complementary explanation for changes in fur seal distribution. The relationship between fur seal distribution and climate is complex and has not been studied intensively. Two climatic factors — high air temperatures and long hours of sunshine during the summer months — appear to influence the northward limits of the distribution of breeding colonies (Wilson 1974: 37-40). During periods with lower summer air temperatures and insolation a gradual northward extension of the breeding range would be expected, and in warmer periods the breeding range would be reduced. It is unlikely that fur seal distribution would respond rapidly to climatic changes, as this species is very conservative in its use of locations for breeding colonies. Fur seals have a strong tendency to return to the colony at which they were born, and females almost always breed at a colony at which they have previously given birth to a pup (Wilson 1974: 120). Thus a delay factor can be postulated, with fur seals continuing to breed in areas long after climatic changes have made these only marginally suitable for them. This is what seems to be evidenced at Tairua. There is now a considerable body of evidence concerning the nature and dating of climatic changes during the last millennium in New Zealand (H. M. Leach 1976: 162-6). Although the early occupation layer at Tairua has not been dated securely, it appears to coincide with one of the warmer, rather than cooler periods in New Zealand prehistory.

Fur seals are large animals, providing considerable quantities of meat, skins for clothing, and possibly blubber or oil for heating, lighting, or cooking. As such they would have been potentially important economic resources. Limitations imposed upon the exploitation of fur seals by their preference for certain habitats, and by seasonal fluctuations in the size and structure of their population may have been significant factors in determining the settlement patterns and seasonal economic activities of the prehistoric inhabitants in the areas in which they were available. There are some indications that this was the case on the south-west coast of Chatham Island (Smith 1976: 67-78). As fur seals appear to have been distributed more widely than has been thought previously, then factors such as these will need to be considered in the interpretation of archaeolgical material from areas in which it can be shown that they were present.

CONCLUSION

The application of modern zoological, behavioural and osteometric data to the Tairua sea mammal assemblage has permitted some tentative conclusions to be drawn about the nature of sea mammal exploitation at the site. The number and age/sex distribution of fur seals in the assemblage suggests regular predation of a breeding colony rather than exploitation of stray visitors or stranded animals. There is good reason to believe that these animals were killed and butchered elsewhere, and that the meaty body parts alone were brought to the site. The other sea mammals appear to represent a more opportunistic aspect of the food-quest, with the evidence from the elephant seal in particular indicating consumption of an animal stranded or killed on or near to the site.

The indications of seasonality provided by sea mammals fit well with those drawn from the bird and shellfish data. Exploitation of the sea mammals is most likely to have occurred during the winter, although other seasons cannot be discounted entirely.

More important perhaps, is the incompatibility of present day fur seal distribution with the evidence from Tairua and other Coromandel coast Archaic sites for the presence of fur seal colonies in this area. Therefore, it is suggested that a complete reassessment of the natural distribution of the New Zealand fur seal is required, taking into account climatic change and the effects of human predation before the onset of extensive European sealing in the nineteenth century. This will be possible only if further collections of sea mammal bone from archaeological sites are subjected to the same type of analysis as presented here.

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